



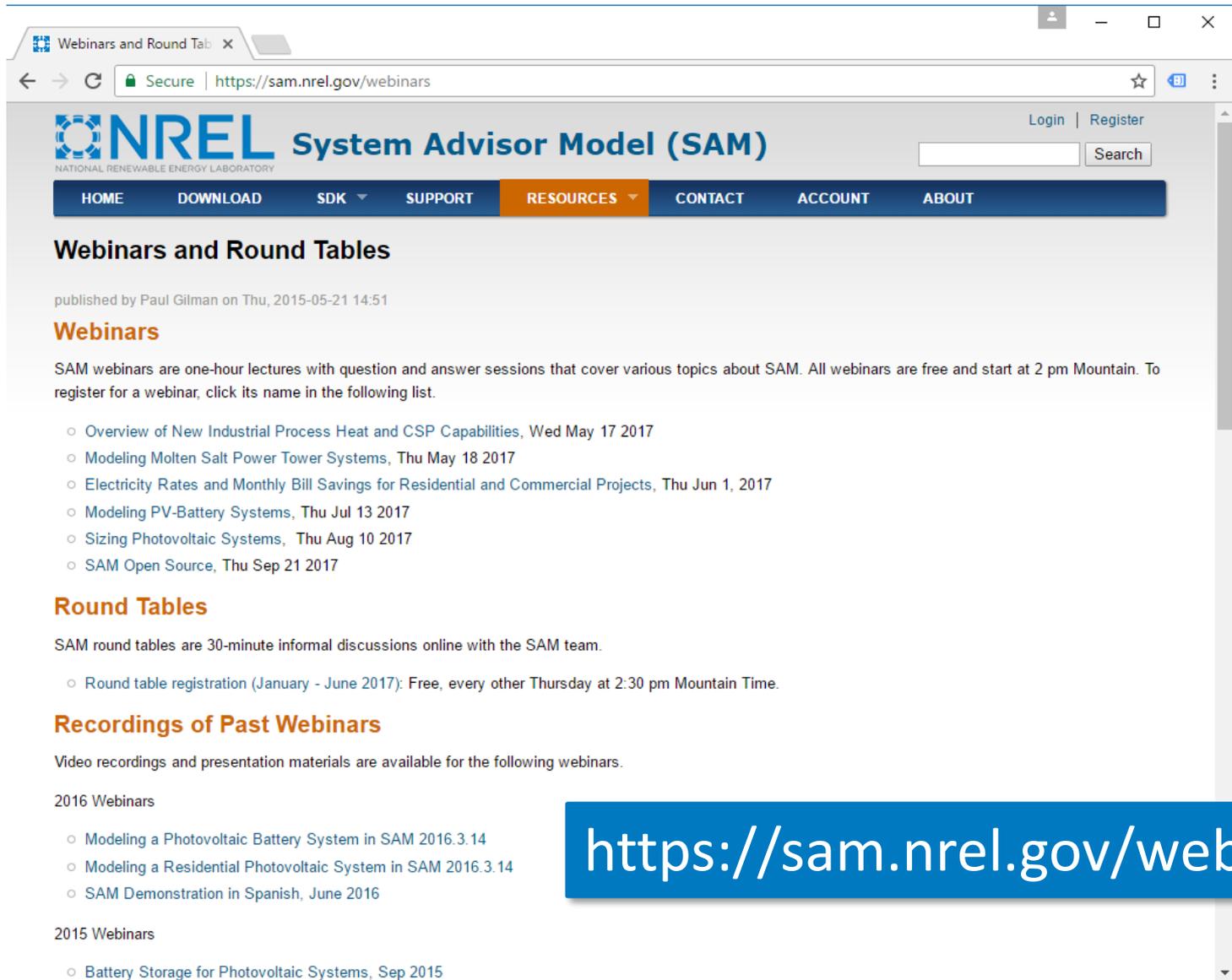
SAM Webinars 2017: Electricity Rates and Bill Savings for Residential and Commercial Projects in SAM 2017.1.17

Paul Gilman

June 1, 2017

- Overview of New Industrial Process Heat and CSP Capabilities, May 17
- Modeling Molten Salt Power Tower Systems, May 18
- **Electricity Rates and Monthly Bill Savings for Residential and Commercial Projects, June 1**
- Modeling PV-Battery Systems, July 13
- Sizing Photovoltaic Systems, August 10
- SAM Open Source, September 21

Registration Links and Webinar Recordings



The screenshot shows a web browser window displaying the NREL System Advisor Model (SAM) website. The browser's address bar shows the URL <https://sam.nrel.gov/webinars>. The website header includes the NREL logo, the text "System Advisor Model (SAM)", and navigation links for "HOME", "DOWNLOAD", "SDK", "SUPPORT", "RESOURCES", "CONTACT", "ACCOUNT", and "ABOUT". A search bar is also present. The main content area is titled "Webinars and Round Tables" and includes a publication date: "published by Paul Gilman on Thu, 2015-05-21 14:51".

Webinars

SAM webinars are one-hour lectures with question and answer sessions that cover various topics about SAM. All webinars are free and start at 2 pm Mountain. To register for a webinar, click its name in the following list.

- Overview of New Industrial Process Heat and CSP Capabilities, Wed May 17 2017
- Modeling Molten Salt Power Tower Systems, Thu May 18 2017
- Electricity Rates and Monthly Bill Savings for Residential and Commercial Projects, Thu Jun 1, 2017
- Modeling PV-Battery Systems, Thu Jul 13 2017
- Sizing Photovoltaic Systems, Thu Aug 10 2017
- SAM Open Source, Thu Sep 21 2017

Round Tables

SAM round tables are 30-minute informal discussions online with the SAM team.

- Round table registration (January - June 2017): Free, every other Thursday at 2:30 pm Mountain Time.

Recordings of Past Webinars

Video recordings and presentation materials are available for the following webinars.

2016 Webinars

- Modeling a Photovoltaic Battery System in SAM 2016.3.14
- Modeling a Residential Photovoltaic System in SAM 2016.3.14
- SAM Demonstration in Spanish, June 2016

2015 Webinars

- Battery Storage for Photovoltaic Systems, Sep 2015

<https://sam.nrel.gov/webinars>

Outline

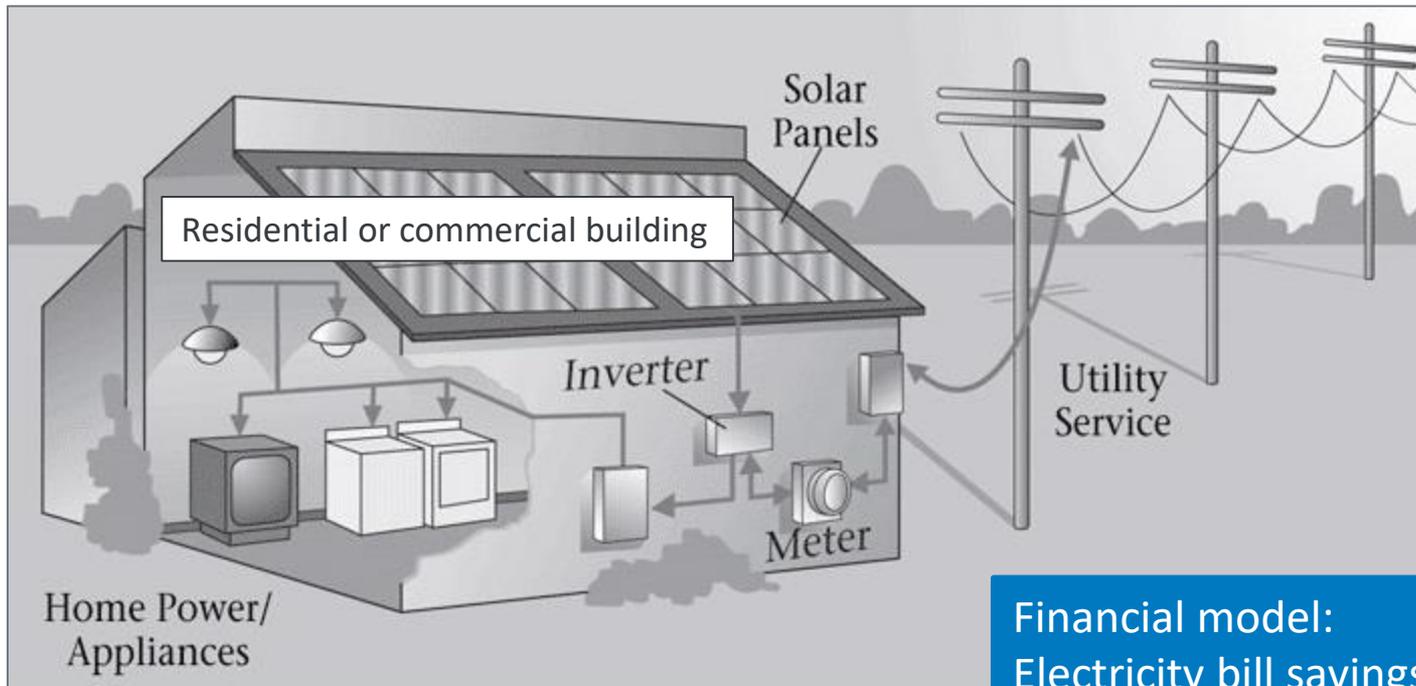
- Definition of distributed residential and commercial projects
- Weather and building electric load data
- Electricity rate inputs
- Electricity bill savings
- Impact of bill savings on project cash flow
- Macro for rate switching
- Q&A

Distributed Energy Projects

A distributed energy system is on the customer side of the electricity meter

Renewable energy system

Grid: Utility rates



Electricity consumption:
Electric load

Financial model:
Electricity bill savings
Taxes
Debt
Incentives
Installation, operating costs

Compensation to the electricity customer for electricity generated by the renewable energy system varies

- Monthly credit for excess generation
 - Net metering
- Self consumption
 - System generation is always less than load so there is no excess generation
- Sell excess generation at a sell rate
 - Feed-in tariff
- Sell all generation
 - System generation sold to grid at sell rate
 - Load purchased from grid at buy rate

Load and Weather Data

Load data describes electricity usage of building or facility

Input Time Series Load Data ▾

Electric Load Data

Energy usage kW

Normalize supplied load profile to monthly utility bill data

Scaling factor (optional)

Monthly energy usage kWh

Energy is monthly total of hourly load by month

-Monthly Load Summary

	Energy (kWh)	Peak (kW)
Jan	375.09	0.88
Feb	331.33	0.86
Mar	334.22	0.89
Apr	369.36	1.22
May	479.39	1.64
Jun	692.69	2.03
Jul	842.23	2.08
Aug	772.63	2.06
Sep	621.74	1.91
Oct	499.87	1.60
Nov	324.82	0.81
Dec	376.53	0.90
Annual	6,019.90	2.08

-Annual Adjustment

Load growth rate %/yr

In Value mode, the growth rate applies to the previous year's annual kWh load starting in Year 2. In Schedule mode, each year's rate applies to the Year 1 kWh value. See Help for details.

Peak is maximum of hourly (or subhourly) load by month

You can see the load data from the load page or after a simulation on the Results page

Input Time Series Load Data ▾

Electric Load Data

Open the data viewer to see the data

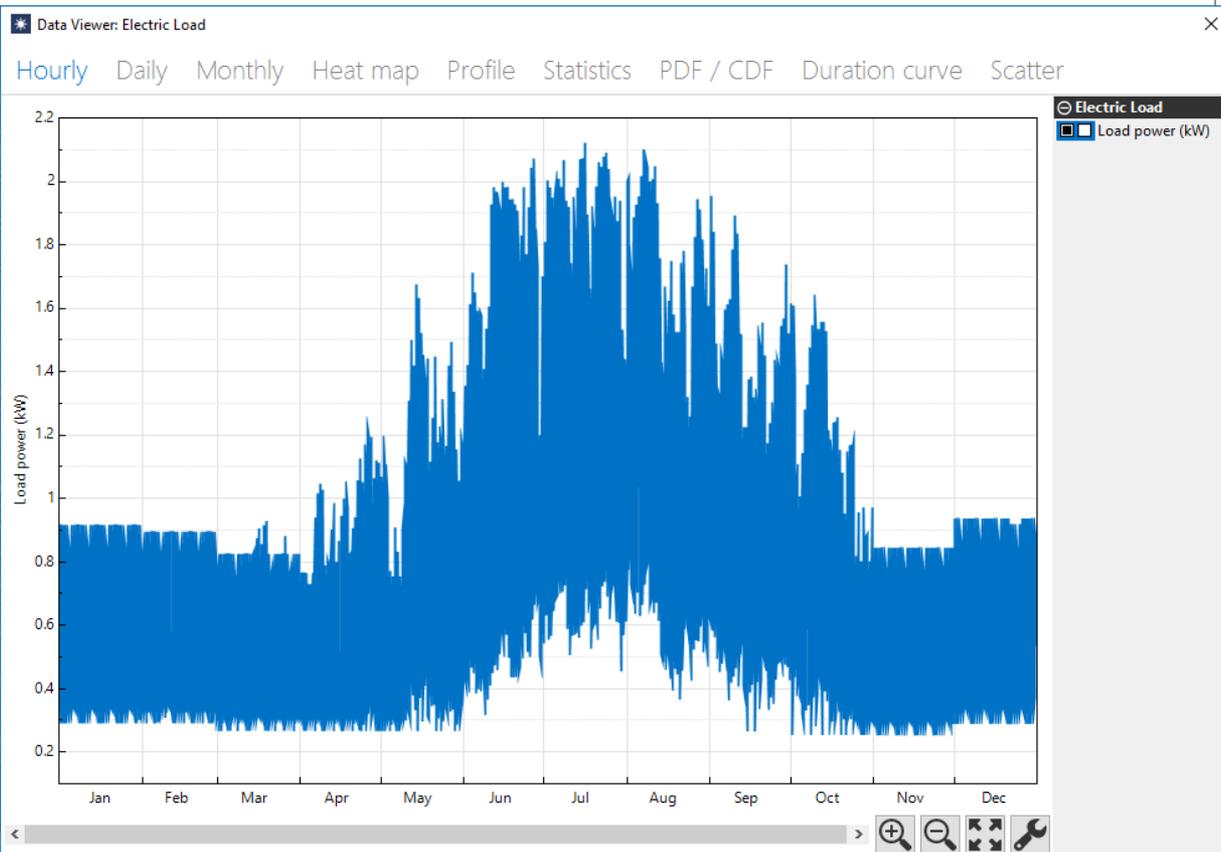
Scaling factor (optional)

Normalize supplied load profile to monthly utility bill data

Monthly energy usage kWh

-Monthly Load Summary

	Energy (kW)
Jan	375.0
Feb	331.3
Mar	334.2
Apr	369.3
May	479.3
Jun	692.6
Jul	842.2
Aug	772.6
Sep	621.7
Oct	499.8
Nov	324.8
Dec	376.5
Annual	6,019.9



Import one year of load data when it is available

The screenshot shows a software interface for importing load data. The main window has a menu 'Input Time Series Load Data' and a button 'Click to import data'. Below it, there's a section for 'Energy usage' with a unit of 'kW' and a checkbox 'Normalize supplied load profile to monthly utility bill data'. A 'Scaling factor (optional)' field is also present. An 'Edit Data' dialog box is open, showing 'Change time step...' set to 'Subhourly Values (8760x1/TS)'. The dialog has buttons for 'Copy', 'Paste', 'Import', and 'Export'. A table within the dialog shows 'Load power (kW)' values for 13 rows. A callout box explains that load data should be for one year: 8760 values for hourly data with no leap day, and no daylight savings. Another callout points to the 'Import' button, stating that data should be imported from a text file with one column and an extra row at the top for a header. A third callout points to the 'Change time step...' button, stating that for subhourly data, the time step should be entered, e.g., 15 for 15-minute data. At the bottom of the dialog, there's a note: 'The electric load is specified as the average power over the time interval. For hourly load data, this is equivalent to entering energy usage in each hour, in kWh.' and 'OK' and 'Cancel' buttons.

Input Time Series Load Data

Click to import data

Energy usage Edit data... kW Normalize supplied load profile to monthly utility bill data

Scaling factor (optional)

Edit Data

Change time step... Subhourly Values (8760x1/TS)

Copy Paste Import Export

	Load power (kW)
1	0.408648
2	0.357441
3	0.342144
4	0.337044
5	0.327441
6	0.359645
7	0.443928
8	0.549341
9	0.482851
10	0.386304
11	0.378283
12	0.377475
13	0.374345

The electric load is specified as the average power over the time interval. For hourly load data, this is equivalent to entering energy usage in each hour, in kWh.

OK Cancel

Import data from a text file with one column and an extra row at the top for a header (export the default data to see the format)

For subhourly data enter the time step, e.g., enter 15 for 15-minute data

Load data should be for one year: 8760 values for hourly data with no leap day, and no daylight savings

You can adjust the underlying data to make it better match monthly totals from an electricity bill

Input T

Check to scale underlying data to monthly totals

Electric Load Data

Energy usage kW

Normalize supplied load profile to monthly utility bill data

Scaling factor (optional)

Monthly energy usage kWh

Enter monthly bill totals

-Monthly Load Summary-

	Energy (kWh)	Peak (kW)
Jan	300.00	0.70
Feb	300.00	0.78
Mar	300.00	0.80
Apr	300.00	0.99
May	300.00	1.02
Jun	400.00	1.17
Jul	500.00	1.24
Aug	500.00	1.33
Sep	400.00	1.23
Oct	300.00	0.96
Nov	300.00	0.74
Dec	300.00	0.72
Annual	4,200.00	1.33

-Annual Adjustment-

Load growth rate
In Value mode, the
year's annual kWh
mode, each year
See Help for details

Edit Values

Monthly energy usage (kWh)

	Value
Jan	200
Feb	200
Mar	200
Apr	200
May	400
Jun	500
Jul	650
Aug	600
Sep	550
Oct	400
Nov	300
Dec	200

Enter single value:

You can also adjust the entire year's worth of data uniformly

Input Time Series Load Data ▾

Electric Load Data

Energy usage kW

Normalize supplied load profile to monthly utility bill data

Scaling factor (optional)

Monthly energy usage kWh

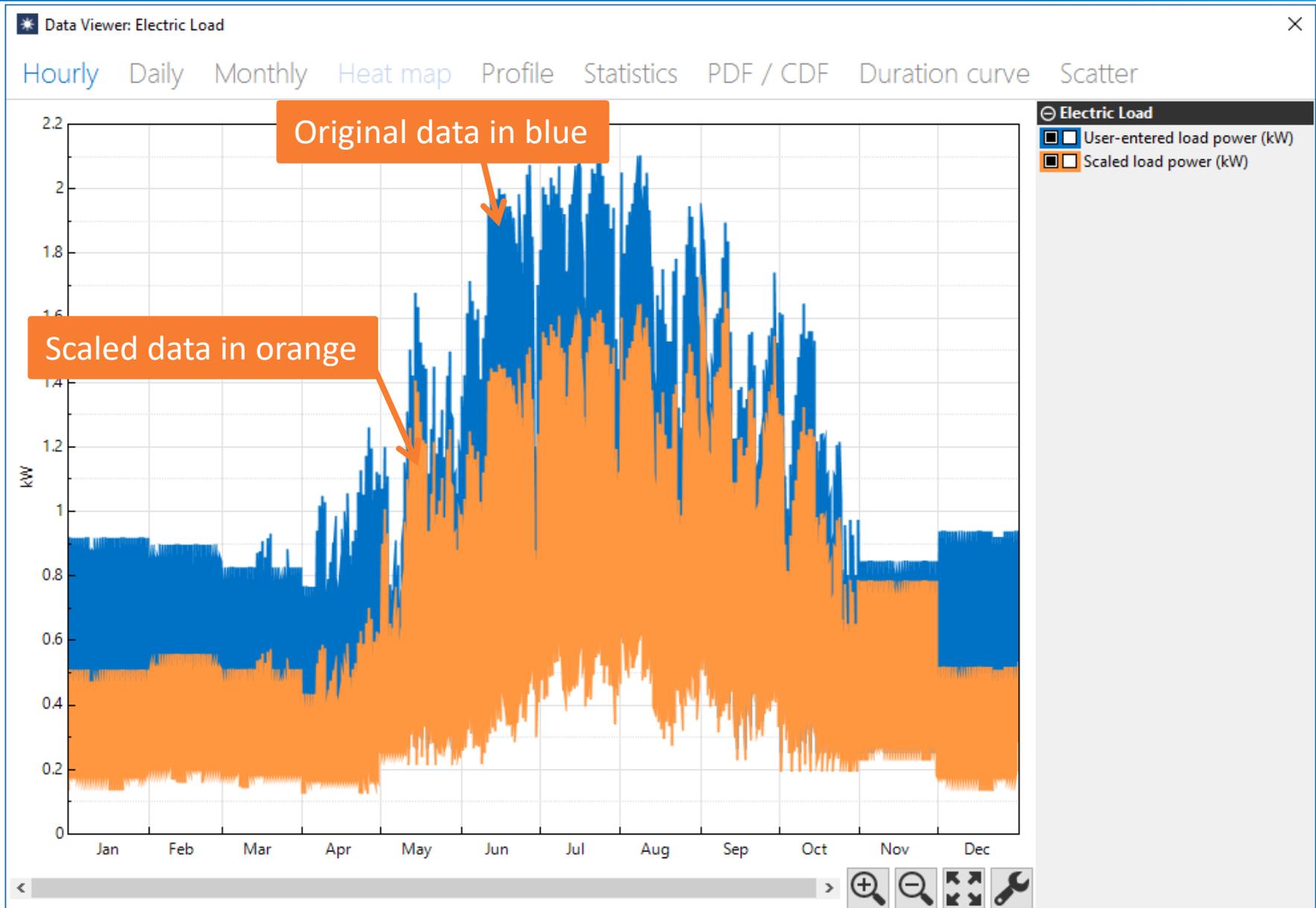
Enter a scaling factor to scale all data by a single factor. For example, a scaling factor of 2 with hourly load data will double the load in each hour.

Monthly Load Summary

	Energy (kWh)	Peak
Jan	750.18	1.76
Feb	662.66	1.71
Mar	668.43	1.78
Apr	738.73	2.44
May	958.78	3.27
Jun	1,385.38	4.06
Jul	1,684.46	4.16
Aug	1,545.26	4.12
Sep	1,243.48	3.83
Oct	999.73	3.20
Nov	649.63	1.61
Dec	753.07	1.80
Annual	12,039.80	4.16

In Value mode, the growth rate applies to the previous year's annual kWh load starting in Year 2. In Schedule mode, each year's rate applies to the Year 1 kWh value. See Help for details.

When you normalize data to monthly values, the data viewer shows both scaled and original data



Use the load calculator to estimate load data from data in the weather file and information about the building

Calculate Load Data ▾

No Load Data

Input Time Series Load Data

Calculate Load Data

Floor area sq ft

Year built

Number of stories

Number of occupants

Energy retrofitted

Occupancy schedule fraction/hr

-Temperature Settings-

Heating setpoint °F

Cooling setpoint °F

Heating setback point °F

Cooling setup point °F

Temperature schedule on/off

-Electric Appliances-

Cooling system

Heating system

Range (stove)

Refrigerator

Dishwasher

Washing machine

Dryer

Misc. electric loads

-Monthly Load Data-

Jan	<input type="text" value="725.00"/> kWh	Jul	<input type="text" value="1,925.00"/> kWh
Feb	<input type="text" value="630.00"/> kWh	Aug	<input type="text" value="1,730.00"/> kWh
Mar	<input type="text" value="665.00"/> kWh	Sep	<input type="text" value="1,380.00"/> kWh
Apr	<input type="text" value="795.00"/> kWh	Oct	<input type="text" value="1,080.00"/> kWh
May	<input type="text" value="1,040.00"/> kWh	Nov	<input type="text" value="635.00"/> kWh
Jun	<input type="text" value="1,590.00"/> kWh	Dec	<input type="text" value="715.00"/> kWh

Be sure to enter monthly totals from the electricity

Annual Adjustment

Load growth rate %/yr

In Value mode, the growth rate applies to the previous year's annual kWh load starting in Year 2. In Schedule mode, each year's rate applies to the Year 1 kWh value. See Help for details.

Use the annual adjustment when you expect the load to change from year to year

-Annual Adjustment-

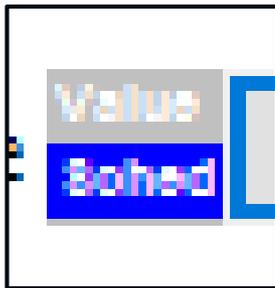
Load growth rate %/yr

In Value mode, the growth rate applies to the previous year's annual kWh load starting in Year 2. In Schedule mode, each year's rate applies to the Year 1 kWh value. See Help for details.

Enter an annual growth rate (zero means no load growth, between zero and one means the load decreases annually)...

...or, click **Sched** to enter an adjustment for each year

Load growth rate %/yr



Edit Schedule

	Value
1	0
2	0
3	0
4	0
5	2
6	2
7	2
8	2
9	2
10	5
11	5
12	5
13	5

Number of values:

Type a load growth rate (%) for each year. Each year's growth rate applies to the total annual load in Year 1.

Load growth and system degradation on the Lifetime page both affect the annual value of savings

Annual Adjustment

Load growth rate %/yr

In Value mode, the growth rate applies to the previous year's annual kWh load starting in Year 2. In Schedule mode, each year's rate applies to the Year 1 kWh value. See Help for details.

PV simulation over one year

System Performance Degradation

Degradation rate %/year

Applies to the system's total annual AC output.

In Value mode, the degradation rate applies to the system's total annual kWh output for the previous year starting in Year 2. In Schedule mode, each year's rate applies to the Year 1 value. See Help for details.

Photovoltaic, Residential

Location and Resource

Module

Inverter

System Design

Shading and Snow

Losses

Lifetime

Battery Storage

Summary Data tables Losses Graphs **Cash flow** Time series Profiles Statistics

Copy to clipboard Save as CSV Send to Excel Send to Excel with Equations

	0	1	2	3	4	5	6	7	8	9	10	11	12
PRODUCTION													
Energy (kWh)	0	5,507	5,480	5,452	5,425	5,398	5,371	5,344	5,318	5,291	5,264	5,238	5,211
SAVINGS													
Value of electricity savings (\$)	0	867	884	902	919	938	956	975	994	1,013	1,033	1,053	1,072

Weather data describes solar resource and meteorological conditions and should be consistent with load data

Photovoltaic, Residential

Location and Resource

Module

Inverter

System Design

Shading and Snow

Losses

Lifetime

Battery Storage

System Costs

Financial Parameters

Incentives

Electricity Rates

Electric Load

Download a weather file from the NREL NSRDB

Download...

Click Download and type a street address or latitude and longitude to download a weather file from the NREL NSRDB for United States and some international locations. SAM adds the downloaded file to the solar resource library so it will appear in the list below.

[NSRDB Map](#)

Choose a weather file from the solar resource library

Click a name in the list to choose a file from the library. Type a few letters of the name in the search box to filter the list. If your location is not in the library, try downloading a file (see above).

Search for: Name

Name	Station ID	Latitude	Longitude	Time zone	Elevation
USA AZ Grand Canyon Natl P (TMY3)	723783	35.95	-112.15	-7	2065
USA AZ Kingman (amos) (TMY3)	723700	35.267	-113.95	-7	1033
USA AZ Luke Afb (TMY3)	722785	33.55	-112.367	-7	331
USA AZ Page Muni (amos) (TMY3)	723710	36.933	-111.45	-7	1304
USA AZ Phoenix (TMY2)	23183	33.4333	-112.017	-7	339
USA AZ Phoenix Sky Harbor Intl Ap (TMY3)	722780	33.45	-111.083	-7	337

City

Time zone

Latitude

State

Elevation

Longitude

Country

Data Source

Station ID

Data file

Tools

View data...

Refresh library

Folder settings...

Open library folder...

Annual Weather Data Summary

Global horizontal kWh/m²/day

Average temperature °C

Direct normal (beam) kWh/m²/day

Average wind speed m/s

Diffuse horizontal kWh/m²/day

Maximum snow depth cm

[Visit SAM weather data website](#)

Heating and cooling loads vary with solar irradiance and ambient temperature!

Load data should have same time step as weather data

Hourly Data ✕			
	Electricity load (year 1) (kW)	Weather file ambient temperature (C)	Array POA beam radiation after shading and soiling (kW)
Jul 5, 12:00 am	1.86394	14.859	0
Jul 5, 01:00 am	1.55509	14.6869	0
Jul 5, 02:00 am	1.38745	14.4469	0
Jul 5, 03:00 am	1.36829	14.1693	0
Jul 5, 04:00 am	1.38292	14.2041	0
Jul 5, 05:00 am	1.54114	15.505	0
Jul 5, 06:00 am	1.77748	17.2233	0
Jul 5, 07:00 am	2.32727	18.6161	0
Jul 5, 08:00 am	2.57259	19.2877	0
Jul 5, 09:00 am	2.50087	19.8745	1.05395
Jul 5, 10:00 am	2.60602	20.1794	0.260542
Jul 5, 11:00 am	2.6153	20.5319	0.372594
Jul 5, 12:00 pm	2.50636	22.09	0.519009
Jul 5, 01:00 pm	2.41866	23.4485	0.170596
Jul 5, 02:00 pm	2.35655	23.6029	0
Jul 5, 03:00 pm	2.23441	22.4805	0.17206
Jul 5, 04:00 pm	2.61606	21.6342	0.246036
Jul 5, 05:00 pm	3.31588	20.5767	0.273963
Jul 5, 06:00 pm	3.4193	19.5439	0
Jul 5, 07:00 pm	3.17551	18.2706	0
Jul 5, 08:00 pm	5.03187	16.7275	0
Jul 5, 09:00 pm	4.51718	15.8477	0
Jul 5, 10:00 pm	3.53489	15.3914	0
Jul 5, 11:00 pm	2.70142	15.2005	0

Use LK script to convert hourly weather file to 15-minutes

Sample Files | System Ad

Secure <https://sam.nrel.gov/samples>

NREL System Advisor Model (SAM)
NATIONAL RENEWABLE ENERGY LABORATORY

Login | Register

HOME DOWNLOAD SDK SUPPORT **RESOURCES** CONTACT ACCOUNT ABOUT

Sample Files

published by Paul Gilman on Mon, 2014-10-27 15:47

The files below are intended to serve as examples to help you learn how to use different SAM features. The data in the files is fictitious, and not intended to represent costs or designs of any particular project or system.

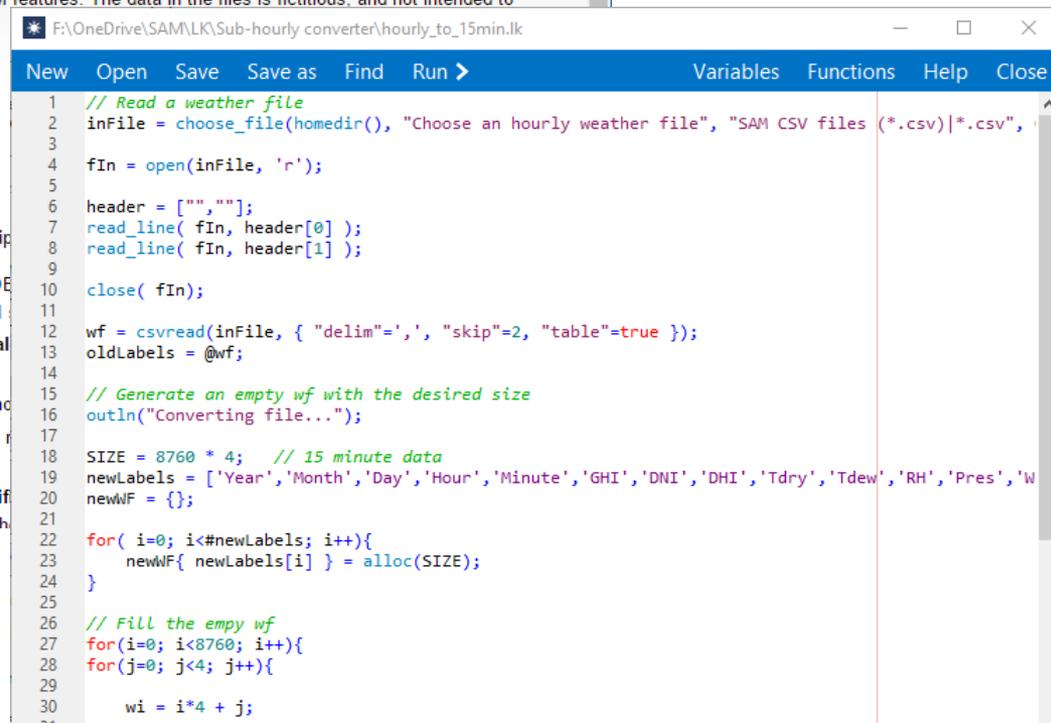
SAM files

- Photovoltaic microinverter example (SAM 346 KB)
- Parametric Quick Setup examples with explanatory notes (SAM 1.1 MB)

LK Script Cookbook

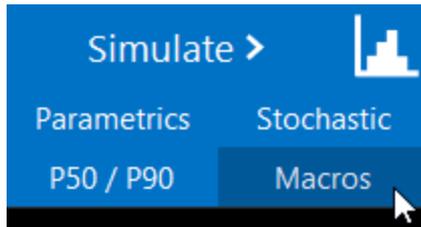
The following script examples are for specific tasks you might want to include in your LK script.

- Read electric utility rate data from the OpenEI International Utility Rate Database (IURDB) of the IURDB. Uses `curl()` and `json_read()` functions to download and parse a JSON.
- SAM 2017.1.17 has a new scripting capability for the photovoltaic models' 3D Shade Calc functions for creating and managing objects in the scene. (LK 1 KB)
- Work with the "Specify desired array size" and "Specify modules and inverters" sizing model.
- Convert an hourly weather file in SAM CSV format from hourly to 15-minute data by r steps in the hour. (LK 1.37 KB)**
- Work with solar resource data files. Use the `use_specific_weather_file` and `user_specific_solar_resource_library` or to choose a file stored on disk. Also demonstrates how to use the

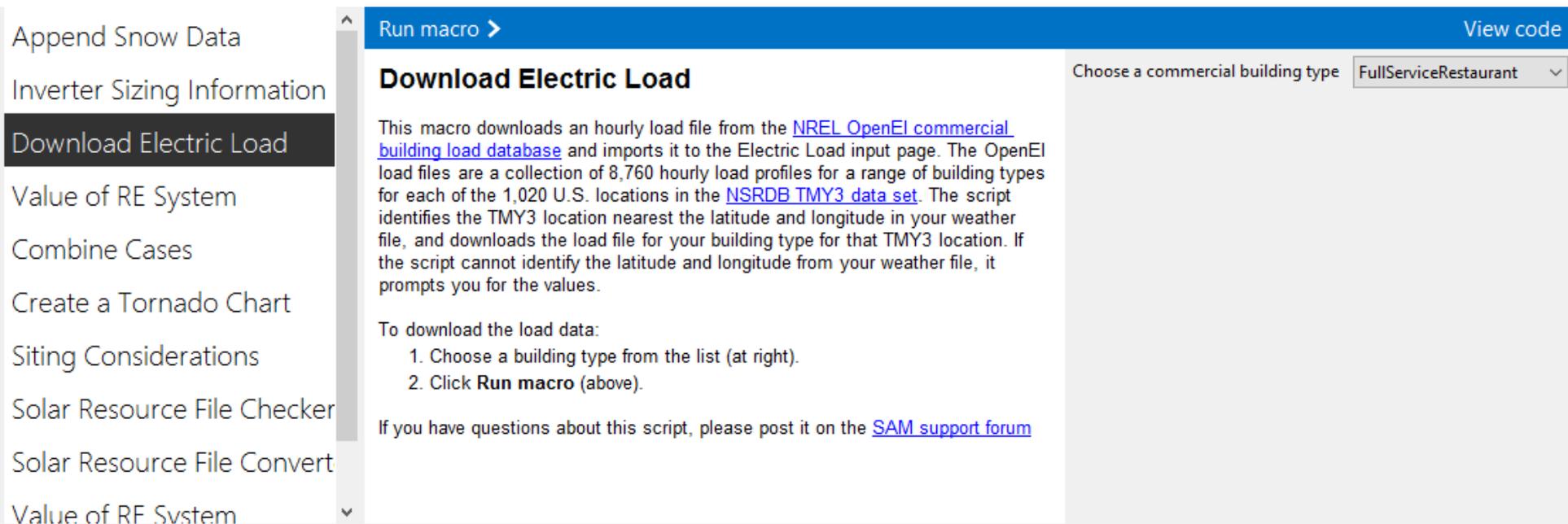


```
F:\OneDrive\SAM\LK\Sub-hourly converter\hourly_to_15min.lk
New Open Save Save as Find Run Variables Functions Help Close
1 // Read a weather file
2 inFile = choose_file(homedir(), "Choose an hourly weather file", "SAM CSV files (*.csv)|*.csv", );
3
4 fIn = open(inFile, 'r');
5
6 header = [ "", "" ];
7 read_line( fIn, header[0] );
8 read_line( fIn, header[1] );
9
10 close( fIn );
11
12 wf = csvread(inFile, { "delim"=',', "skip"=2, "table"=true });
13 oldLabels = @wf;
14
15 // Generate an empty wf with the desired size
16 outln("Converting file...");
17
18 SIZE = 8760 * 4; // 15 minute data
19 newLabels = [ 'Year', 'Month', 'Day', 'Hour', 'Minute', 'GHI', 'DNI', 'DHI', 'Tdry', 'Tdew', 'RH', 'Pres', 'W' ];
20 newWF = {};
21
22 for( i=0; i<#newLabels; i++){
23     newWF{ newLabels[i] } = alloc(SIZE);
24 }
25
26 // Fill the empty wf
27 for(i=0; i<8760; i++){
28     for(j=0; j<4; j++){
29
30         wi = i*4 + j;
31     }
```

For commercial projects, the “Download Electric Load” macro downloads sample load data for different building types



This is modeled data based on TMY3 weather files, so may work best with TMY3 data in SAM.



Append Snow Data

Inverter Sizing Information

Download Electric Load

Value of RE System

Combine Cases

Create a Tornado Chart

Siting Considerations

Solar Resource File Checker

Solar Resource File Convert

Value of RE System

Run macro >

Download Electric Load

Choose a commercial building type

View code

This macro downloads an hourly load file from the [NREL OpenEI commercial building load database](#) and imports it to the Electric Load input page. The OpenEI load files are a collection of 8,760 hourly load profiles for a range of building types for each of the 1,020 U.S. locations in the [NSRDB TMY3 data set](#). The script identifies the TMY3 location nearest the latitude and longitude in your weather file, and downloads the load file for your building type for that TMY3 location. If the script cannot identify the latitude and longitude from your weather file, it prompts you for the values.

To download the load data:

1. Choose a building type from the list (at right).
2. Click **Run macro** (above).

If you have questions about this script, please post it on the [SAM support forum](#)

Electricity Rate Inputs

Electricity Rates input page describes rate structure

- Accounting of excess generation
- Fixed and minimum charges
- Annual escalation rates
- Energy charges
- Demand charges

- Monthly total excess rolled over to next month bill in kWh
- Monthly total excess credited to next month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to current month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to next month bill in \$ at sell rate(s)
- All generation sold at sell rate(s) and all load purchased at buy rate(s)

Fixed Charge

Fixed monthly charge \$

Minimum Charges

Monthly minimum charge \$

Annual minimum charge \$

Electricity bill escalation rate %/yr

Rates for Energy Charges

Period	Tier	Max. Usage	Max. Usage Units	Buy (\$/kWh)
1	1	1e+038	kWh	0.078462
2	1	1e+038	kWh	0.066502
3	1	1e+038	kWh	0.064842
4	1	1e+038	kWh	0.052882

Demand Rates by Month with Optional Tiers

Month	Tier	Peak (kW)	Charge (\$/kW)
Jan	1	1e+038	0
Feb	1	1e+038	0
Mar	1	1e+038	0
Apr	1	1e+038	0
May	1	1e+038	0
Jun	1	1e+038	0
Jul	1	1e+038	0
Aug	1	1e+038	0
Sep	1	1e+038	0
Oct	1	1e+038	0
Nov	1	1e+038	0
Dec	1	1e+038	0

Number entries:

Demand Rates by Time-of-use Period and/or Tiers

Period	Tier	Peak (kW)	Charge (\$/kW)
1	1	100	16.7315
1	2	1e+038	11.6005
2	1	100	7.0005
2	2	1e+038	4.9135

Number of entries:

Translating a rate sheet to SAM requires consolidating rates and fees



RATE SCHEDULE E-32TOU L LARGE GENERAL SERVICE (401 kW +) TIME OF USE

Bundled Standard Offer Service

Basic Service Charge:

For service through Self-Contained Meters:	\$ 0.710	per day, or
For service through Instrument-Rated Meters:	\$ 1.324	per day, or

Bundled Standard Offer Service (cont)

For service at Primary Voltage:	\$ 3.415	per day, or
For service at Transmission Voltage:	\$ 26.163	per day

× 30 days/month

Fixed Charge
Fixed monthly charge 39.72 \$

Download data from OpenEI Utility Rate Database

The screenshot shows the OpenEI Utility Rate Database interface. It includes a search bar for zip codes, a filter for 'pacific' (14 filtered), and a list of utilities. The 'Pacific Power (Oregon)' utility is selected. A list of available rate schedules is shown, with 'Schedule 41- Primary Single Phase/ Three Phase (Less than 300 KW)' selected. The details for this rate are displayed, including the name 'PacifiCorp (Oregon): Schedule 41- Primary Sin', description, start date '2014-06-30', end date 'N/A', and GUID '55fc81b2682bea28da64e064'. At the bottom, there are buttons for 'Show all 3889 utilities', 'Download and apply utility rate', and 'Close'. Annotations in orange boxes provide instructions: 'Download rate data' points to the search bar; 'Narrow lists' points to the filter; 'Show only rates with no end date' points to the 'Show Active Only' checkbox; 'Show commercial, residential, or all rates' points to the 'Available rate schedules' dropdown; 'Choose a utility' points to the utility list; 'Choose a rate' points to the rate schedule list; and 'Download rate' points to the 'Download and apply utility rate' button. A link 'Go to rate page on OpenEI.org... Rate JSON data page...' is also visible.

1 Choose a utility

2 Choose a rate

3 Download rate

Download rate data

Narrow lists

Show only rates with no end date

Show commercial, residential, or all rates

Links to data on OpenEI website

Go to rate page on OpenEI.org...
Rate JSON data page...

Search for rates...

Go to Open EI Utility Rate Database website

OpenEI U.S. Utility Rate Database

Download rate structures for the rate sheet to verify that the

OpenEI Utility Rate Database

Zip code: Search by zip code

Filter: pacific 14 filtered.

Available rate schedules: Commercial Only

Show Active Only

Filter: 41 8 filtered.

Pacific Gas & Electric Co
Pacific Northwest Generating Coop
Pacific Power (California)
Pacific Power (Oregon)
Pacific Power (Washington)
PacifiCorp
PacifiCorp (Idaho)
PacifiCorp (Oregon)
PacifiCorp (Utah)
PacifiCorp (Washington)
PacifiCorp (Wyoming)
Sierra Pacific Industries Inc
Sierra Pacific Power Co
Sierra Pacific Power Co (Nevada)

Schedule 41- Secondary Single Phase/ Three Phase (Less than 300 KW)
Schedule 41- Secondary Third Phase (51-300KW) (55fc81b2682bea28da64e064)
Schedule 41- Secondary Three Phase (Greater than 300 KW) (55fc81b2682bea28da64e064)
Schedule 41- Primary Single Phase/ Three Phase (Less than 300 KW) (55fc81b2682bea28da64e064)
Schedule 41- Primary Three Phase (51-300KW) (55fc81b2682bea28da64e064)
Schedule 41- Primary Three Phase (Greater than 300 KW) (55fc81b2682bea28da64e064)

Name: PacifiCorp (Oregon): Schedule 41- Primary Sin
Description:
Start: 2014-06-30
End: N/A
GUID: 55fc81b2682bea28da64e064

Show all 3889 utilities

Ready.

Download and apply utility rate Close

Description and Applicability data is for reference only, it does not affect calculations



Description and Applicability

The description and applicability information is for your reference. SAM does not use it in calculations. The information is from the U.S. Utility Rate Database, but may not correspond to the actual energy charge and demand charge data from the database. The description fields are editable, so you can change them to suit your needs.

Description

Name

Schedule

Source

Start date

URI

Description

This link is to the rate sheet used to generate the data

Applicability

Demand minimum kW

Energy minimum kWh

Voltage minimum V

Demand maximum kW

Energy maximum kWh

Voltage maximum V

Demand history months

Energy history months

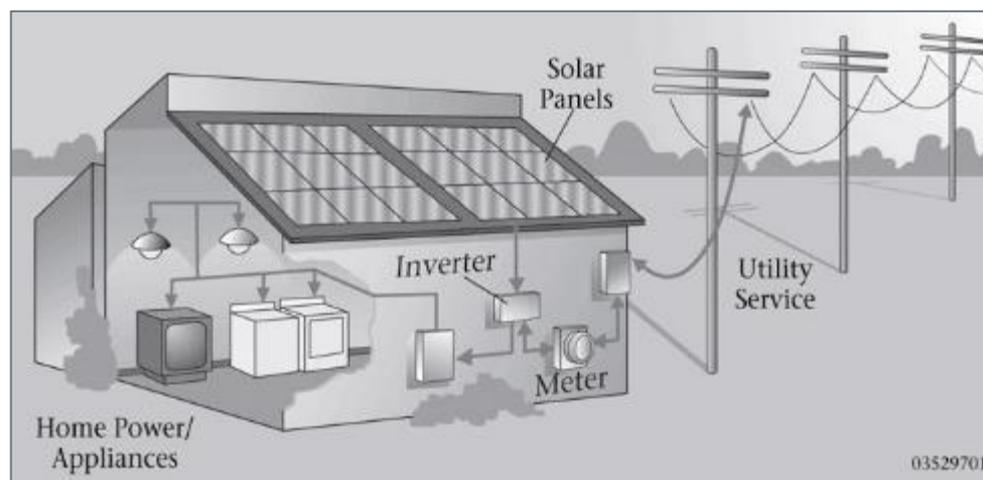
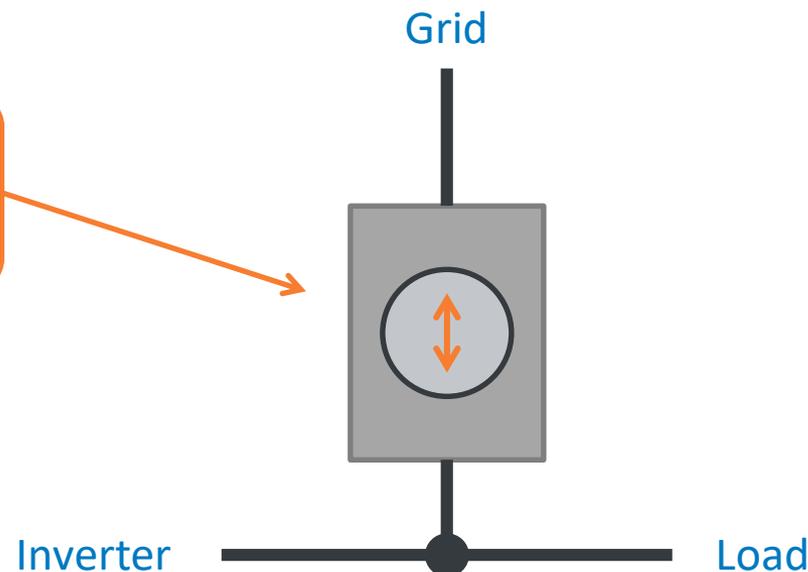
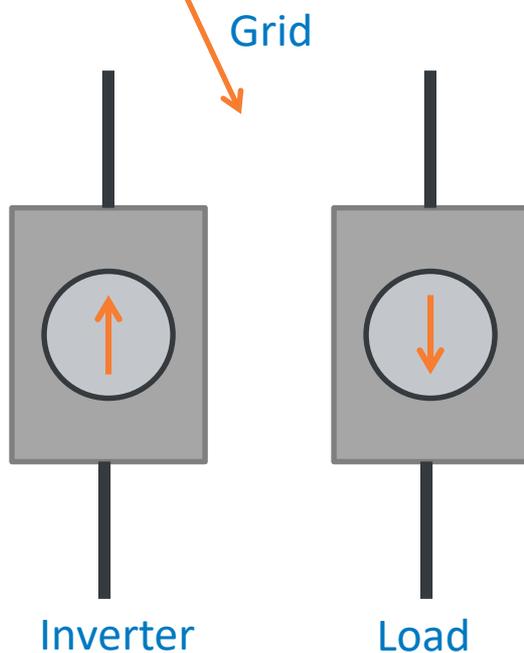
Voltage category

Phase wiring

Excess generation is not part of rate structure, so you have to choose the appropriate option yourself

Monthly Accounting of Excess Generation

- Monthly total excess rolled over to next month bill in kWh
- Monthly total excess credited to next month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to current month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to next month bill in \$ at sell rate(s)
- All generation sold at sell rate(s) and all load purchased at buy rate(s)



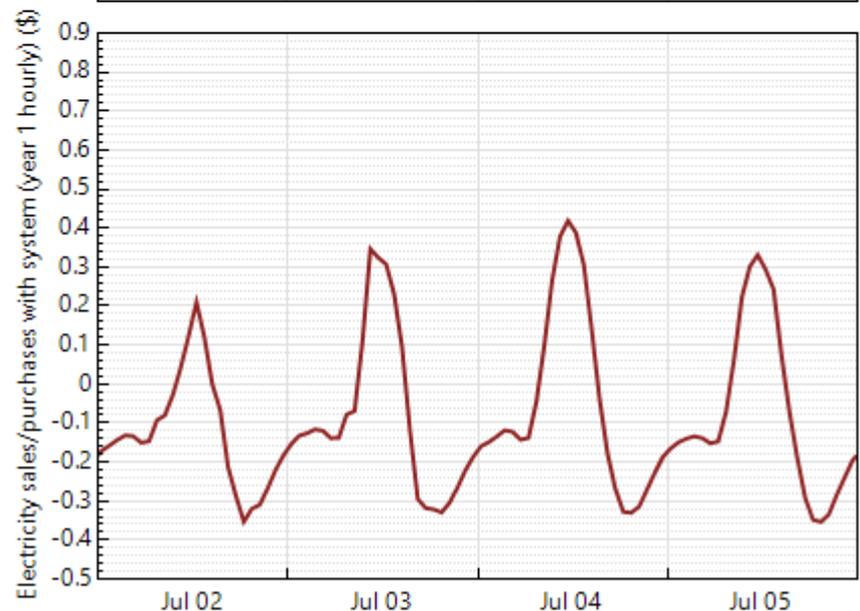
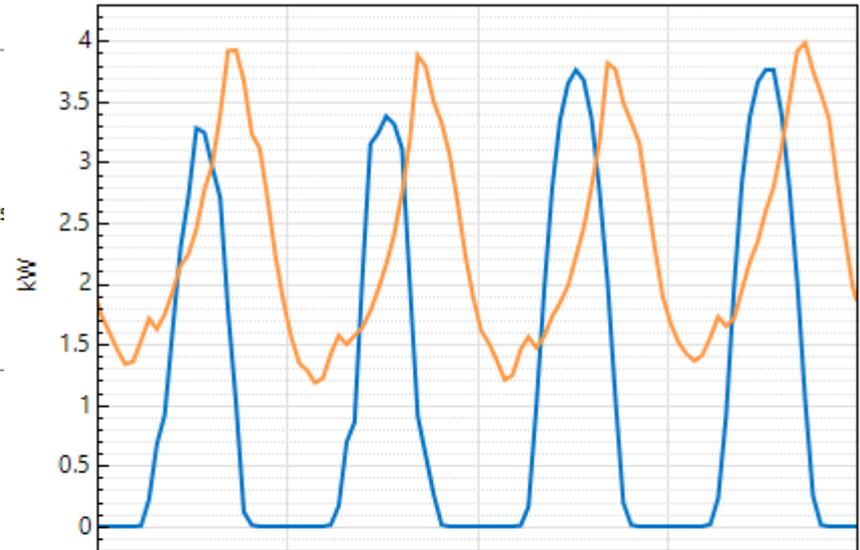
Excess generation can be calculated from monthly totals, or for each time step

Monthly Accounting of Excess Generation

- Monthly total excess rolled over to next month bill in kWh
- Monthly total excess credited to next month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to current month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to next month bill in \$ at sell rate(s)
- All generation sold at sell rate(s) and all load purchased at buy rate(s)

Monthly Data	System AC energy (kWh/mo)	Electricity load (kWh/mo)	Excess generation kWh credit earned (kWh)	Excess generation kWh credit applied (kWh)
Jan	542.661	750.181	0	0
Feb	599.618	662.66	0	0
Mar	738.094	668.435	69.6587	0
Apr	840.203	738.728	101.473	0
May	902.161	958.778	0	171.131
Jun	849.058	1385.38	0	114.513
Jul	848.652	1684.46	0	0
Aug	826.564	1545.26	0	0
Sep	760.704	1243.48	0	0
Oct	722.865	999.734	0	0
Nov	569.861	649.631	0	0
Dec	513.993	753.069	0	0

- Hourly Data: System power generated (kW)
- Hourly Data: Electricity load (year 1) (kW)
- Hourly Data: Electricity sales/purchases with system (year 1 hourly) (\$)



Monthly data table on Results page shows accounting of excess generation for monthly options

Monthly Accounting of Excess Generation

- Monthly total excess rolled over to next month bill in kWh
- Monthly total excess credited to next month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to current month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to next month bill in \$ at sell rate(s)
- All generation sold at sell rate(s) and all load purchased at buy rate(s)

} Monthly



[Summary](#) [Data tables](#) [Losses](#) [Graphs](#) [Cash flow](#)

[Copy to clipboard](#) [Save as CSV...](#) [Send to Excel](#) [Clear all](#)

Monthly Data ×				
	System AC energy (kWh/mo)	Electricity load (kWh/mo)	Excess generation kWh credit earned (kWh)	Excess generation kWh credit applied (kWh)
Jan	542.661	750.181	0	0
Feb	599.618	662.66	0	0
Mar	738.094	668.435	69.6587	0
Apr	840.203	738.728	101.473	0
May	902.161	958.778	0	171.131
Jun	849.058	1385.38	0	114.513
Jul	848.652	1684.46	0	0
Aug	826.564	1545.26	0	0
Sep	760.704	1243.48	0	0
Oct	722.865	999.734	0	0
Nov	569.861	649.631	0	0
Dec	513.993	753.069	0	0

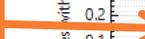
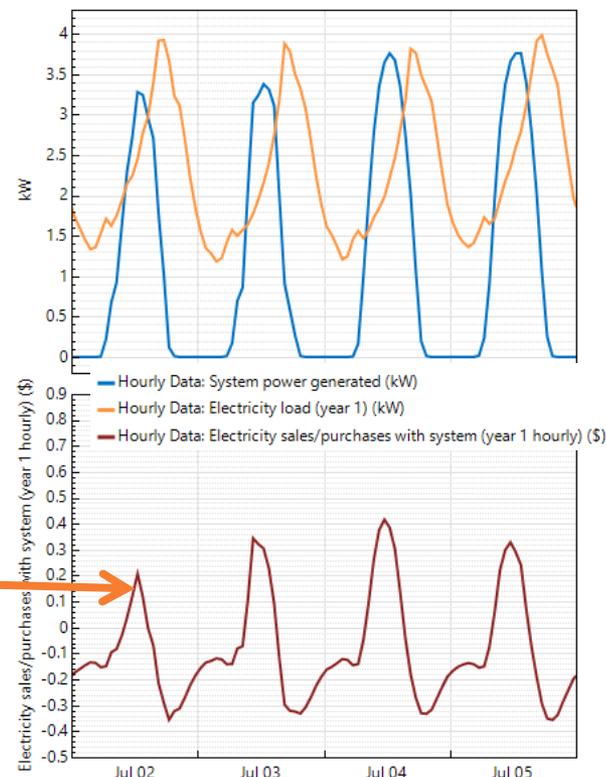
Time series graph (or data table) shows excess generation for hourly options

Monthly Accounting of Excess Generation

- Monthly total excess rolled over to next month bill in kWh
- Monthly total excess credited to next month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to current month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to next month bill in \$ at sell rate(s)
- All generation sold at sell rate(s) and all load purchased at buy rate(s)

} Hourly or subhourly

ables Losses Graphs Cash flow Time series Profiles Sta



Grid sales is difference between generation and load

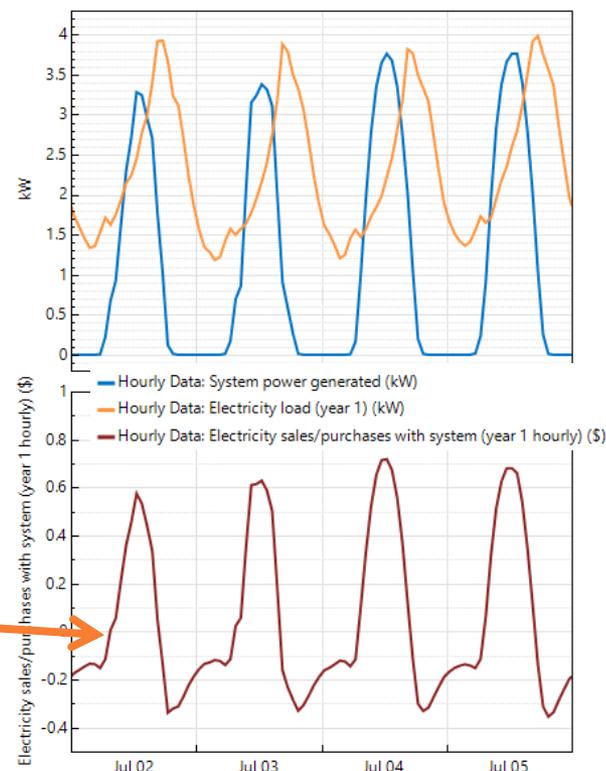
All generation may be sold separately from the load

Monthly Accounting of Excess Generation

- Monthly total excess rolled over to next month bill in kWh
- Monthly total excess credited to next month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to current month bill in \$ at sell rate(s)
- Cumulative hourly (subhourly) excess credited to next month bill in \$ at sell rate(s)
- All generation sold at sell rate(s) and all load purchased at buy rate(s)

} Hourly or subhourly

ables Losses Graphs Cash flow Time series Profiles Sta



Grid sales is system generation times sell rate,
grid purchases (negative) are load times buy rate

Fixed and minimum charges apply to each month's bill

Fixed Charge

Fixed monthly charge \$

Minimum Charges

Monthly minimum charge \$

Annual minimum charge \$

	Electricity bill with system (\$/mo)	Energy charge with system (\$/mo)	Demand charge (TOU) with system (\$/mo)	Fixed monthly charge with system (\$/mo)	Minimum charge with system (\$/mo)
Jan	56.3756	22.1246	17.571	16.68	0
Feb	50	14.731	17.1432	16.68	1.4458
Mar	50	7.49393	17.7864	16.68	8.03966
Apr	50	3.22119	23.852	16.68	6.24678
May	56.3106	11.5533	28.0772	16.68	0
Jun	90.8645	37.8437	36.3407	16.68	0
Jul	114.844	59.2725	38.8919	16.68	0
Aug	107.528	51.4092	39.4389	16.68	0
Sep	85.6363	34.9964	33.9599	16.68	0
Oct	66.8273	21.1836	28.9638	16.68	0
Nov	50	12.3249	16.1323	16.68	4.86278
Dec	57.4298	22.7706	17.9792	16.68	0

Additional charge required to meet monthly minimum

Energy charges depend on energy rates, time-of-use periods and tiers

Energy Charges

Rates for Energy Charges

Import...	Period	Tier	Max. Usage	Max. Usage Units	Buy (\$/kWh)
	1	1	1e+038	kWh	0.26687
Export...	2	1	1e+038	kWh	0.08328
Copy	3	1	1e+038	kWh	0.22057
Paste	4	1	1e+038	kWh	0.08326

Number of entries:

Time-of-use rates apply at times indicated by weekday and weekend matrices

Weekday

	12am	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm
Jan	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	4	4	4	4	4
Feb	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	4	4	4	4	4
Mar	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	4	4	4	4	4
Apr	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	4	4	4	4	4
May	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2
Jun	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2
Jul	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2
Aug	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2
Sep	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2
Oct	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	2	2	2	2	2
Nov	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	4	4	4	4	4
Dec	4	4	4	4	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	4	4	4	4	4

Weekend

	12am	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm
Jan	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Feb	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Mar	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Apr	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
May	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Jun	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Jul	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Aug	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Sep	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Oct	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Nov	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Dec	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Select a rectangle and then type a number on your keyboard to assign period numbers to the weekday and weekend matrices

The table for a simple flat rate should have one row with a single period and tier (Period 1 and Tier 1)

Energy Charges

Rates for Energy Charges

Import...	Period	Tier	Max. Usage	Max. Usage Units	Buy (\$/kWh)
Export...	1	1	1e+038	kWh	0.26687

Copy

Paste

Number of entries:

1

Change the number of entries to add or remove rows from table

Weekday

	12am	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm
Jan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Feb	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mar	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
May	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sep	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Weekend

	12am	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm
Jan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Feb	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mar	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
May	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sep	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

The demand charge tables are separate for rates defined by months, and rates defined by time-of-use period



Demand Charges

Rates for Demand Charges

Enable demand charges

Demand Rates by Month with Optional Tiers

Import...	Month	Tier	Peak (kW)	Charge (\$/kW)
Export...	Jan	1	1e+038	5
Copy	Feb	1	1e+038	5
Paste	Mar	1	1e+038	5
Number entries:	Apr	1	1e+038	5
12	May	1	1e+038	5
	Jun	1	1e+038	10
	Jul	1	1e+038	10
	Aug	1	1e+038	10
	Sep	1	1e+038	5
	Oct	1	1e+038	5
	Nov	1	1e+038	5
	Dec	1	1e+038	5

These rates apply by month

Demand Rates by Time-of-use Period and/or Tiers

Import...	Period	Tier	Peak (kW)	Charge (\$/kW)
Export...	1	1	500	2
Copy	1	2	1e+038	7
Paste				
Number of entries:				
2				

These rates apply by time-of-use period (a single period applies to all months in this example)

Weekday

	12am	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm
Jan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Feb	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mar	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
May	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sep	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

	12am	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	12pm	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm
Jan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Feb	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mar	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Apr	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
May	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Jul	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Aug	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sep	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Oct	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Nov	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dec	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Tiers may apply to either monthly rates, time-of-use rates, or both.

Electricity Bill Savings and Cash Flow

Use monthly tables to see how monthly bill is calculated

Summary Data tables Losses Graphs Cash flow Time series Profiles Statistics Heat map PDF / CDF Notices

Copy to clipboard Save as CSV... Send to Excel Clear all

with system

Single Values

Electricity Rate Data by Tier and Period

Monthly Data

- Demand charge (TOU) with system (\$/mo)
- Demand charge (TOU) without system (\$/mo)
- Demand charge (flat) with system (\$/mo)
- Demand charge (flat) without system (\$/mo)
- Electricity bill with system (\$/mo)
- Electricity bill without system (\$/mo)
- Electricity load (kWh/mo)
- Electricity to/from grid (kWh/mo)
- Electricity use with system (kWh/mo)
- Electricity use without system (kWh/mo)
- Energy charge with system (\$/mo)
- Energy charge with system before credits (\$)
- Energy charge without system (\$/mo)
- Excess generation \$ credit applied (\$)
- Excess generation \$ credit earned (\$)
- Excess generation \$ credit earned (\$/mo)
- Excess generation kWh credit applied (kWh)
- Excess generation kWh credit earned (kWh)
- Excess generation kWh credit earned (kWh/mo)
- Fixed monthly charge with system (\$/mo)
- Fixed monthly charge without system (\$/mo)

	Electricity bill with system (\$/mo)	Energy charge with system (\$/mo)	Demand charge (TOU) with system (\$/mo)	Fixed monthly charge with system (\$/mo)
Jan	56.3756	22.1246	17.571	16.68
Feb	48.5542	14.731	17.1432	16.68
Mar	41.9603	7.49393	17.7864	16.68
Apr	43.7532	3.22119	23.852	16.68
May	56.3106	11.5533	28.0772	16.68
Jun	90.8645	37.8437	36.3407	16.68
Jul	114.844	59.2725	38.8919	16.68
Aug	107.528	51.4092	39.4389	16.68
Sep	85.6363	34.9964	33.9599	16.68
Oct	66.8273	21.1836	28.9638	16.68
Nov	45.1372	12.3249	16.1323	16.68
Dec	57.4298	22.7706	17.9792	16.68

Electricity bill savings based on difference between bill with and without renewable energy system

Summary Data tables Losses

Metric	Value
Annual energy (year 1)	8,714 kWh
Capacity factor (year 1)	21.2%
Energy yield (year 1)	1,857 kWh/kW
Performance ratio (year 1)	0.79
Battery efficiency	0.00%
Levelized COE (nominal)	7.14 ¢/kWh
Levelized COE (real)	5.65 ¢/kWh
Electricity bill without system (year 1)	\$973
Electricity bill with system (year 1)	- \$125
Net savings with system (year 1)	\$848
Net present value	\$4,498
Payback period	11.8 years
Discounted payback period	22.9 years
Net capital cost	\$13,758
Equity	\$0
Debt	\$13,758

Bill with and without system are based on the same rate structure.

The annual bill savings represents the value of the renewable energy system in the cash flow

Summary Data tables Losses Graphs Cash flow Time series Profiles Statistics Hea

Copy to clipboard Save as CSV Send to Excel Send to Excel with Equations

	0	1	2	3	4	5	6	7	8	9	10	11	12	13
PRODUCTION														
Energy (kWh)	0	8,714	8,671	8,627	8,584	8,541	8,499	8,456	8,414	8,372	8,330	8,288	8,247	8,20
SAVINGS														
Value of electricity savings (\$)	0	848	868	888	909	931	953	975	998	1,022	1,046	1,070	1,096	1,12

LCOE, NPV, and payback metrics are based on after-tax cash flows

Summary Data tables Losses

Metric	Value
Annual energy (year 1)	8,714 kWh
Capacity factor (year 1)	21.2%
Energy yield (year 1)	1,857 kWh/kW
Performance ratio (year 1)	0.79
Battery efficiency	0.00%
Levelized COE (nominal)	7.14 ¢/kWh
Levelized COE (real)	5.65 ¢/kWh
Electricity bill without system (year 1)	\$973
Electricity bill with system (year 1)	\$125
Net savings with system (year 1)	\$848
Net present value	\$4,648
Payback period	11.8 years
Discounted payback period	22.9 years
Net capital cost	\$13,758
Equity	\$0
Debt	\$13,758

Data tables Losses Graphs Cash flow Time series Profiles

	0	1	2	3	4	5	6	7	8	9	10
FEDERAL INCOME TAX											
Federal taxable income less deductions (\$)	0	2,672	-754	-740	-725	-710	-694	-677	-659	-640	-621
Federal PTC (\$)	0	0	0	0	0	0	0	0	0	0	0
Federal ITC (\$)		4,128									
Federal tax savings (\$)	0	3,326	226	222	218	213	208	203	198	192	187
After-tax annual costs (\$)	0	5,478	-1,068	-1,079	-1,091	-1,103	-1,115	-1,128	-1,142	-1,156	-1,170
After-tax cash flow (\$)	0	6,326	-200	-191	-181	-172	-163	-153	-144	-134	-125

Rate Switching Scenarios

Use the “Value of RE System” macro to calculate metrics based on a different rate structure for the “without system” scenario

Simulate >

Parametrics Stochastic

P50 / P90 Macros **1**

Append Snow Data

Inverter Sizing Information

Discount Rate WACC

Download Electric Load

Value of RE System **2**

Combine Cases

Create a Tornado Chart

Siting Considerations

Solar Resource File Checker

Solar Resource File Converter

Value of RE System

Run macro > **4**

Value of RE System

This macro creates cost and savings tables to help you determine the value of electricity generated by a renewable energy (RE) system with and without storage. The tables display data for two or three scenarios:

- ◆ No RE system
- ◆ RE system with no storage
- ◆ RE system with storage (optional)

You may choose a different electricity rate structure for the "no RE system" scenario than the two "RE system" scenarios. For example, with no RE system, the bill can be for a simple flat rate, while the RE system is for time-of-use rates.

To use the macro:

1. If you have not already, set up a case for the RE system (with batteries if you are considering storage). The assumptions on the Electricity Rates input page should be for the RE system scenario.
2. Choose a rate option for the "no system" scenario from the list at right. If you choose the flat rate option, enter the flat rate and optional fixed monthly charge.
3. Click **Run macro** above.

Tips for interpreting the tables:

The *Total Electricity Bill in Year 1* table gives you an indication of the annual savings you can expect from the RE system, and helps you identify the components of the bill that most contribute to the savings. For example it might show that demand reduction contributes more to bill savings than shifting energy usage to a different time.

The *Present Value of Annual Costs and Net Present Value* table shows details of total lifecycle costs of the system over its life (analysis period) and the value of the electricity bill savings over that time. The "NPV of project with bill savings" indicates the total value of the system: A more positive NPV indicates a more cost-effective scenario. A negative

Rate option for "no system" scenario: 2. Flat rate

Flat rate (\$/kWh) for Option 2: 0.12 **3**

Fixed monthly charge (\$/mo) for Option 2: 0

View code

The macro generates tables of results in a separate window so results are not available in the SAM case

Value of RE for "kwh rollover" Case

Total Electricity Bill in Year 1

Charge	No System	RE System
Energy	\$722	\$0
Fixed	\$0	\$200
Demand (fixed)	\$0	\$0
Demand (TOU)	\$0	\$0
Monthly minimum	\$0	\$0
Annual minimum	\$0	\$0
Year end net metering credit	\$0	\$-75
Total bill	\$722	\$125
Savings compared to no system	\$0	\$597

Present Value of Annual Costs and Net Present Value

Present Value	No System	RE System
Electricity bill	\$9,454	\$1,780
System costs after tax	\$0	\$6,306
Battery replacement cost	\$0	\$0
Total cost	\$0	\$8,086
NPV of project with bill savings	\$0	\$4,648